

REMARKS

Claims 1-29 are all the claims presently pending in the application.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-6 and 19-26 are allowed. Applicants gratefully acknowledge that claims 8, 9, and 13-18 would be allowable if rewritten in independent form. However, Applicant respectfully submits that all of the claims are allowable.

Claims 7 and 12 stand rejected under 35 USC §102(b) as anticipated by US Patent 6,720,522 to Ikegami et al., and claim 10 stands rejected under 35 USC §103(a) as unpatentable over Ikegami. It is noted that the Examiner seems to have overlooked claims 27-29, as the claims were amended and augmented in the Preliminary Amendment filed on June 23, 2003. It is also noted that the Examiner has indicated on the Office Action Summary page that claim 1 is both allowed and rejected.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

As described, for example in claim 7, the claimed invention is directed to a method of producing a plurality of semiconductor elements by individually dividing semiconductor elements formed on a substrate by performing a polishing or blasting process with respect to separation grooves after forming said separation grooves by laser beam irradiation.

This polishing or blasting of the area of the grooves cleans out the substrate melt and re-solidified remains left by the laser beam irradiation. As explained at lines 20-25 of page 3, such remains cause opaque deposits on the outer surface of the light emitting elements, particularly when the elements are formed on a transparent sapphire substrate, thereby reducing the light-extracting efficiency of the element. As further explained at lines 1-5 of page 4, the molten semiconductor material can also cause undesirable effects such as

short circuits.

In contrast, in the above-described embodiment of the present invention, the polishing or blasting process removes most of the substrate melt and re-solidification remains in the separation grooves, thereby reducing the loss of efficiency of the conventional method due to the re-solidified substrate melt, as specifically stated at lines 14-23 of page 14.

In another aspect, as exemplarily described in claim 12, the claimed invention is directed to a method of producing a plurality of semiconductor elements by individually dividing said semiconductor elements formed on a substrate, including removing semiconductor layers on parting lines so that (i) only an electrode-forming layer on a side near to the substrate remains on the parting lines or (ii) there is no semiconductor layer on the parting lines. The substrate along the parting lines are scanned with a laser beam to thereby form broken line-shaped or dot line-shaped separation grooves. The broken line-shaped or dot line-shaped separation grooves formed by the laser beam scanning along the parting lines are used so that the substrate is divided into individual semiconductor elements.

This technique of turning the laser beam on and off to cause broken- or dotted-lines for the separation grooves is shown in Figure 11. As explained in lines 5-13 of page 18, this technique of using broken segments of separation grooves reduces the area of the molten portion formed by laser irradiation, thereby reducing the rate of area of melt deposited on side surfaces so that, again, light-extracting efficiency of the elements is improved.

II. THE PRIOR ART REJECTIONS

The Examiner alleges that Ikegami teaches the claimed invention described by claims 7 and 12 and renders obvious the invention described in claim 10. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by Ikegami.

As explained in the Abstract and elsewhere, Ikegami teaches an entirely different method of removing the contamination caused by laser machining of chips. That is, Ikegami uses a liquid transparent to the laser light, is used to flush away the contaminants and reduce heat. Thus, Ikegami clearly teaches against the technique of the present invention.

More specifically, relative to claim 7, the Examiner points to Figures 4A-4C and lines 40-45 of column 9 and line 13 of column 15 of Ikegami and alleges that this description teaches the invention described in that claim.

Applicants respectfully disagree.

That is, Figures 4A-4C, as described beginning at line 52 of column 8, demonstrates in Figures 4A and 4C the difference between using water (Fig. 4A) and aqueous ammonia (Fig. 4C). Figure 4B shows the effect using a blade 13.

Lines 40-45 of column 9 is understood by Applicants as the Examiner pointing to the description of Figure 4A. The Examiner's reference to line 13 of column 15 is understood by Applicants as the Examiner attempting to justify the use of the laser in Ikegami for purpose of creating dicing lines.

However, Applicants submit that, to one having ordinary skill in the art, these descriptions do not in any way satisfy the plain meaning of the claim language. That is, there is no suggestion in these lines or figures of a polishing or blasting process to clean out the separation grooves created by a laser beam. Indeed, Ikegami seems to suggest that no such cleaning is necessary or desirable, since the transparent liquid is expected to reduce heat and carry away any of the undesirable contaminants resultant from the lasing operation.

Stated slightly differently, Applicants submit that the Examiner seems to fail to understand the "blasting process". The Examiner alleges that Ikegami, at lines 65-66 of column 8, discloses the feature of polishing or blasting. However, Applicants submit that Ikegami merely guides the laser beam 2A to the target surface 11A of the wafer 11. Further, Ikegami at line 1 of column 9 describes: "... while supplying a liquid to the target surface 11A." Such description is completely different from the "polishing or blasting process" of the present invention.

The "blasting process" of the present invention involves a process of blowing fine particles on the subject to be processed, using high pressure, to polish the surface of the subject, as explained, for example at line 24 of page 13 through line 1 of page 14. Ikegami clearly fails to teach or suggest such feature.

Hence, turning to the clear language of the claims, in Ikegami, there is no teaching or suggestion of: "... performing a polishing or blasting process with respect to separation

grooves after forming said separation grooves by laser beam irradiation", as required by claim 7.

Relative to the rejection for claim 12, this description refers to the broken separation grooves shown in Figures 11A-11E, wherein the grooves are discontinuous. Applicants submit that Ikegami has no suggestion of this technique of using discontinuous grooves created by laser beam irradiation.

In the rejection, the Examiner points to Figure 4C and lines 1-5 of column 10 and lines 12-20 of column 15 of Ikegami. However, Applicants submit that, to one having ordinary skill in the art, these cited locations do not suggest in any way the technique of using a disconnected separation groove, let alone one generated by a laser beam irradiation.

As mentioned earlier, this technique of using broken segments of separation grooves, explained in lines 5-13 of page 18, reduces the area of the molten portion formed by laser irradiation, thereby reducing the rate of area of melt deposited on side surfaces so that, again, light-extracting efficiency of the elements is improved.

Ikegami uses a transparent liquid to reduce heat and carry away contaminants caused by laser beam irradiation. However, there is no indication that the separation groove in Ikegami be discontinuous and Applicants submit that the heat removal effect of the liquid precludes that there be a modification of Ikegami for purpose of reducing heat from the laser irradiation.

Therefore, Applicant submits that there are elements of the claimed invention that are not taught or suggested by Ikegami. Therefore, the Examiner is respectfully requested to reconsider and withdraw these rejections based on Ikegami.

III. FORMAL MATTERS AND CONCLUSION

A minor change has been made to the specification to correct the description of Figure 12.

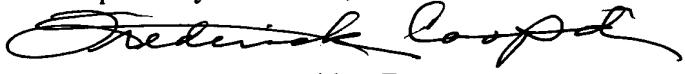
In view of the foregoing, Applicant submits that claims 1-29, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

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Respectfully Submitted,



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